



SEQUENCE LISTING

<110> Zhen-Gang
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<120> GENE RECOMBINATION AND HYBRID PROTEIN DEVELOPMENT

<130> 9373/1H812-US3

<140> US 10/016,668

<141> 2001-10-26

<150> US 09/863,765

<151> 2001-05-23

<150> US 60/207,048

<151> 2000-05-23

<150> US 60/235,960

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<150> US 60/283,567

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<160> 6

<170> PatentIn version 3.1

<210> 1

<211> 361

<212> PRT

<213> Enterobacter cloacae

<300>

<308> SWIS-PROT / P05364

<309> 1988-11-09

<313> (1)..(361)

<400> 1

Thr Pro Val Ser Glu Lys Gln Leu Ala Glu Val Val Ala Asn Thr Ile
1 5 10 15

Thr Pro Leu Met Lys Ala Gln Ser Val Pro Gly Met Ala Val Ala Val
20 25 30

Ile Tyr Gln Gly Lys Pro His Tyr Tyr Thr Phe Gly Lys Ala Asp Ile
35 40 45

Ala Ala Asn Lys Pro Val Thr Pro Gln Thr Leu Phe Glu Leu Gly Ser
50 55 60

Ile Ser Lys Thr Phe Thr Gly Val Leu Gly Gly Asp Ala Ile Ala Arg
65 70 75 80

Gly Glu Ile Ser Leu Asp Asp Ala Val Thr Arg Tyr Trp Pro Gln Leu
85 90 95

Thr Gly Lys Gln Trp Gln Gly Ile Arg Met Leu Asp Leu Ala Thr Tyr
100 105 110

Thr Ala Gly Gly Leu Pro Leu Gln Val Pro Asp Glu Val Thr Asp Asn
115 120 125

Ala Ser Leu Leu Arg Phe Tyr Gln Asn Trp Gln Pro Gln Trp Lys Pro
130 135 140

Gly Thr Thr Arg Leu Tyr Ala Asn Ala Ser Ile Gly Leu Phe Gly Ala
145 150 155 160

Leu Ala Val Lys Pro Ser Gly Met Pro Tyr Glu Gln Ala Met Thr Thr
165 170 175

Arg Val Leu Lys Pro Leu Lys Leu Asp His Thr Trp Ile Asn Val Pro
180 185 190

Lys Ala Glu Glu Ala His Tyr Ala Trp Gly Tyr Arg Asp Gly Lys Ala
195 200 205

Val Arg Val Ser Pro Gly Met Leu Asp Ala Gln Ala Tyr Gly Val Lys
210 215 220

Thr Asn Val Gln Asp Met Ala Asn Trp Val Met Ala Asn Met Ala Pro
225 230 235 240

Glu Asn Val Ala Asp Ala Ser Leu Lys Gln Gly Ile Ala Leu Ala Gln
245 250 255

Ser Arg Tyr Trp Arg Ile Gly Ser Met Tyr Gln Gly Leu Gly Trp Glu
260 265 270

Met Leu Asn Trp Pro Val Glu Ala Asn Thr Val Val Glu Gly Ser Asp
275 280 285

Ser Lys Val Ala Leu Ala Pro Leu Pro Val Ala Glu Val Asn Pro Pro
290 295 300

Ala Pro Pro Val Lys Ala Ser Trp Val His Lys Thr Gly Ser Thr Gly
305 310 315 320

Gly Phe Gly Ser Tyr Val Ala Phe Ile Pro Glu Lys Gln Ile Gly Ile
325 330 335

Val Met Leu Ala Asn Thr Ser Tyr Pro Asn Pro Ala Arg Val Glu Ala
340 345 350

Ala Tyr His Ile Leu Glu Ala Leu Gln
355 360

<210> 2
<211> 361
<212> PRT
<213> Citrobacter freundii

<300>
<308> SWIS-PROT / P05193
<309> 1987-08-05
<313> (1)..(361)

<400> 2

Ala Ala Lys Thr Glu Gln Gln Ile Ala Asp Ile Val Asn Arg Thr Ile
1 5 10 15

Thr Pro Leu Met Gln Glu Gln Ala Ile Pro Gly Met Ala Val Ala Ile
 20 25 30

Ile Tyr Glu Gly Lys Pro Tyr Tyr Phe Thr Trp Gly Lys Ala Asp Ile
 35 40 45

Ala Asn Asn His Pro Val Thr Gln Gln Thr Leu Phe Glu Leu Gly Ser
 50 55 60

Val Ser Lys Thr Phe Asn Gly Val Leu Gly Gly Asp Arg Ile Ala Arg
 65 70 75 80

Gly Glu Ile Lys Leu Ser Asp Pro Val Thr Lys Tyr Trp Pro Glu Leu
 85 90 95

Thr Gly Lys Gln Trp Arg Gly Ile Ser Leu Leu His Leu Ala Thr Tyr
 100 105 110

Thr Ala Gly Gly Leu Pro Leu Gln Ile Pro Gly Asp Val Thr Asp Lys
 115 120 125

Ala Glu Leu Leu Arg Phe Tyr Gln Asn Trp Gln Pro Gln Trp Thr Pro
 130 135 140

Gly Ala Lys Arg Leu Tyr Ala Asn Ser Ser Ile Gly Leu Phe Gly Ala
 145 150 155 160

Leu Ala Val Lys Ser Ser Gly Met Ser Tyr Glu Glu Ala Met Thr Arg
 165 170 175

Arg Val Leu Gln Pro Leu Lys Leu Ala His Thr Trp Ile Thr Val Pro
 180 185 190

Gln Ser Glu Gln Lys Asn Tyr Ala Trp Gly Tyr Leu Glu Gly Lys Pro
 195 200 205

Val His Val Ser Pro Gly Gln Leu Asp Ala Glu Ala Tyr Gly Val Lys
 210 215 220

Ser Ser Val Ile Asp Met Ala Arg Trp Val Gln Ala Asn Met Asp Ala
225 230 235 240

Ser His Val Gln Glu Lys Thr Leu Gln Gln Gly Ile Glu Leu Ala Gln
245 250 255

Ser Arg Tyr Trp Arg Ile Gly Asp Met Tyr Gln Gly Leu Gly Trp Glu
260 265 270

Met Leu Asn Trp Pro Leu Lys Ala Asp Ser Ile Ile Asn Gly Ser Asp
275 280 285

Ser Lys Val Ala Leu Ala Ala Leu Pro Ala Val Glu Val Asn Pro Pro
290 295 300

Ala Pro Ala Val Lys Ala Ser Trp Val His Lys Thr Gly Ser Thr Gly
305 310 315 320

Gly Phe Gly Ser Tyr Val Ala Phe Val Pro Glu Lys Asn Leu Gly Ile
325 330 335

Val Met Leu Ala Asn Lys Ser Tyr Pro Asn Pro Ala Arg Val Glu Ala
340 345 350

Ala Trp Arg Ile Leu Glu Lys Leu Gln
355 360

<210> 3

<211> 361

<212> PRT

<213> Yersinia enterocolitica

<300>

<308> SWIS-PROT / P45460

<309> 1995-11-01

<313> (1)..(361)

<400> 3

Thr Lys Leu Thr Glu Leu Gln Val Ala Thr Ile Val Asn Asn Thr Leu
 1 5 10 15
 Thr Pro Leu Leu Glu Lys Gln Gly Ile Pro Gly Met Ala Val Ala Val
 20 25 30
 Phe Tyr Asp Gly Lys Pro Gln Phe Phe Asn Tyr Gly Met Ala Asp Ile
 35 40 45
 Lys Ala Gly Arg Pro Val Thr Glu Asn Thr Leu Phe Glu Leu Gly Ser
 50 55 60
 Val Ser Lys Thr Phe Thr Gly Val Ala Gly Glu Tyr Ala Met Gln Thr
 65 70 75 80
 Gly Ile Met Asn Leu Asn Asp Pro Val Thr Glu Tyr Ala Pro Glu Leu
 85 90 95
 Thr Gly Ser Gln Trp Lys Asp Val Lys Met Leu His Leu Ala Thr Tyr
 100 105 110
 Thr Ala Gly Gly Leu Pro Leu Gln Leu Pro Asp Ser Val Thr Asp Gln
 115 120 125
 Lys Ser Leu Trp Gln Tyr Tyr Gln Gln Trp Gln Pro Gln Trp Ala Pro
 130 135 140
 Gly Val Met Arg Asn Tyr Ser Asn Ala Ser Ile Gly Leu Phe Gly Ala
 145 150 155 160
 Leu Ala Val Lys Arg Ser Gln Leu Thr Phe Glu Asn Tyr Met Lys Glu
 165 170 175
 Tyr Val Phe Gln Pro Leu Lys Leu Asp His Thr Phe Ile Thr Ile Pro
 180 185 190
 Glu Ser Met Gln Ser Asn Tyr Ala Trp Gly Tyr Lys Asp Gly Gln Pro
 195 200 205

Val Arg Val Thr Leu Gly Met Leu Gly Glu Glu Ala Tyr Gly Val Lys
210 215 220

Ser Thr Ser Gln Asp Met Val Arg Phe Met Gln Ala Asn Met Asp Pro
225 230 235 240

Glu Ser Leu Gly Asn Asp Lys Leu Lys Glu Ala Ile Ile Ala Ser Gln
245 250 255

Ser Arg Tyr Phe Gln Ala Gly Asp Met Phe Gln Gly Leu Gly Trp Glu
260 265 270

Met Tyr Ser Trp Pro Ile Asn Pro Gln Gly Val Ile Ala Asp Ser Gly
275 280 285

Asn Asp Ile Ala Leu Lys Pro Arg Lys Val Glu Ala Leu Val Pro Ala
290 295 300

Gln Pro Ala Val Arg Ala Ser Trp Val His Lys Thr Gly Ala Thr Asn
305 310 315 320

Gly Phe Gly Ala Tyr Ile Val Phe Ile Pro Glu Glu Lys Val Gly Ile
325 330 335

Val Met Leu Ala Asn Lys Asn Tyr Pro Asn Pro Val Arg Val Gln Ala
340 345 350

Ala Tyr Asp Ile Leu Gln Ala Leu Arg
355 360

<210> 4
<211> 359
<212> PRT
<213> Klebsiella pneumoniae

<300>
<308> SWISPROT / Q48437
<309> 1996-11-01

<313> (1)..(359)

<400> 4

Tyr Ala Arg Gly Glu Ala Pro Leu Thr Ala Ala Val Asp Gly Ile Ile
1 5 10 15

Gln Pro Met Leu Lys Glu Tyr Arg Ile Pro Gly Met Ala Val Ala Val
20 25 30

Leu Lys Asp Gly Lys Ala His Tyr Phe Asn Tyr Gly Val Ala Asn Arg
35 40 45

Glu Ser Gly Gln Arg Val Ser Glu Gln Thr Leu Phe Glu Ile Gly Ser
50 55 60

Val Ser Lys Thr Leu Thr Ala Thr Leu Gly Ala Tyr Ala Ala Val Lys
65 70 75 80

Gly Gly Phe Glu Leu Asp Asp Lys Val Ser Gln His Ala Pro Trp Leu
85 90 95

Lys Gly Ser Ala Phe Asp Gly Val Thr Met Ala Glu Leu Ala Thr Tyr
100 105 110

Ser Ala Gly Gly Leu Pro Leu Gln Phe Pro Asp Glu Val Asp Ser Asn
115 120 125

Asp Lys Met Arg Thr Tyr Tyr Arg His Trp Ser Pro Val Tyr Pro Ala
130 135 140

Gly Thr His Arg Gln Tyr Ser Asn Pro Ser Ile Gly Leu Phe Gly His
145 150 155 160

Leu Ala Ala Asn Ser Leu Gly Gln Pro Phe Glu Gln Leu Met Ser Gln
165 170 175

Thr Leu Leu Pro Lys Leu Gly Leu His His Thr Tyr Ile Gln Val Pro
180 185 190

Glu Ser Ala Ile Ala Asn Tyr Ala Tyr Gly Tyr Lys Glu Asp Lys Pro
195 200 205

Val Arg Val Thr Pro Gly Val Leu Ala Ala Glu Ala Tyr Gly Ile Lys
210 215 220

Thr Gly Ser Ala Asp Leu Leu Lys Phe Thr Glu Ala Asn Met Gly Tyr
225 230 235 240

Gln Gly Asp Ala Ala Leu Lys Thr Arg Ile Ala Leu Thr His Thr Gly
245 250 255

Phe Tyr Ser Val Gly Asp Met Thr Gln Gly Leu Gly Trp Glu Ser Tyr
260 265 270

Ala Tyr Pro Leu Thr Glu Gln Ala Leu Leu Ala Gly Asn Ser Pro Ala
275 280 285

Val Ser Phe Gln Ala Asn Pro Val Thr Arg Phe Ala Val Pro Lys Ala
290 295 300

Met Gly Glu Gln Arg Leu Tyr Asn Lys Thr Gly Ser Thr Gly Gly Phe
305 310 315 320

Gly Ala Tyr Val Ala Phe Val Pro Ala Arg Gly Ile Ala Ile Val Met
325 330 335

Leu Ala Asn Arg Asn Tyr Pro Ile Glu Ala Arg Val Lys Ala Ala His
340 345 350

Ala Ile Leu Ser Gln Leu Ala
355

<210> 5

<211> 286

<212> PRT

<213> Escherichia coli

<300>

<308> SWIS-PROT / P00810

<309> 1986-07-01

<313> (1)..(286)

<400> 5

Met Ser Ile Gln His Phe Arg Val Ala Leu Ile Pro Phe Phe Ala Ala
1 5 10 15

Phe Cys Leu Pro Val Phe Ala His Pro Glu Thr Leu Val Lys Val Lys
20 25 30

Asp Ala Glu Asp Gln Leu Gly Ala Arg Val Gly Tyr Ile Glu Leu Asp
35 40 45

Leu Asn Ser Gly Lys Ile Leu Glu Ser Phe Arg Pro Glu Glu Arg Phe
50 55 60

Pro Met Met Ser Thr Phe Lys Val Leu Leu Cys Gly Ala Val Leu Ser
65 70 75 80

Arg Val Asp Ala Gly Gln Glu Gln Leu Gly Arg Arg Ile His Tyr Ser
85 90 95

Gln Asn Asp Leu Val Glu Tyr Ser Pro Val Thr Glu Lys His Leu Thr
100 105 110

Asp Gly Met Thr Val Arg Glu Leu Cys Ser Ala Ala Ile Thr Met Ser
115 120 125

Asp Asn Thr Ala Ala Asn Leu Leu Leu Thr Thr Ile Gly Gly Pro Lys
130 135 140

Glu Leu Thr Ala Phe Leu His Asn Met Gly Asp His Val Thr Arg Leu
145 150 155 160

Asp Arg Trp Glu Pro Glu Leu Asn Glu Ala Ile Pro Asn Asp Glu Arg
165 170 175

Asp Thr Thr Met Pro Ala Ala Met Ala Thr Thr Leu Arg Lys Leu Leu
180 185 190

Thr Gly Glu Leu Leu Thr Leu Ala Ser Arg Gln Gln Leu Ile Asp Trp
195 200 205

Met Glu Ala Asp Lys Val Ala Gly Pro Leu Leu Arg Ser Ala Leu Pro
210 215 220

Ala Gly Trp Phe Ile Ala Asp Lys Ser Gly Ala Gly Glu Arg Gly Ser
225 230 235 240

Arg Gly Ile Ile Ala Ala Leu Gly Pro Asp Gly Lys Pro Ser Arg Ile
245 250 255

Val Val Ile Tyr Thr Thr Gly Ser Gln Ala Thr Met Asp Glu Arg Asn
260 265 270

Arg Gln Ile Ala Glu Ile Gly Ala Ser Leu Ile Lys His Trp
275 280 285

<210> 6

<211> 288

<212> PRT

<213> Pseudomonas aeruginosa

<300>

<308> SWIS-PROT / P16897

<309> 1990-08-15

<313> (1)..(288)

<400> 6

Met Lys Phe Leu Leu Ala Phe Ser Leu Leu Ile Pro Ser Val Val Phe
1 5 10 15

Ala Ser Ser Ser Lys Phe Gln Gln Val Glu Gln Asp Val Lys Ala Ile
20 25 30

Glu Val Ser Leu Ser Ala Arg Ile Gly Val Ser Val Leu Asp Thr Gln
35 40 45

Asn Gly Glu Tyr Trp Asp Tyr Asn Gly Asn Gln Arg Phe Pro Leu Thr
50 55 60

Ser Thr Phe Lys Thr Ile Ala Cys Ala Lys Leu Leu Tyr Asp Ala Glu
65 70 75 80

Gln Gly Lys Val Asn Pro Asn Ser Thr Val Glu Ile Lys Lys Ala Asp
85 90 95

Leu Val Thr Tyr Ser Pro Val Ile Glu Lys Gln Val Gly Gln Ala Ile
100 105 110

Thr Leu Asp Asp Ala Cys Phe Ala Thr Met Thr Thr Ser Asp Asn Thr
115 120 125

Ala Ala Asn Ile Ile Leu Ser Ala Val Gly Gly Pro Lys Gly Val Thr
130 135 140

Asp Phe Leu Arg Gln Ile Gly Asp Lys Glu Thr Arg Leu Asp Arg Ile
145 150 155 160

Glu Pro Asp Leu Asn Glu Gly Lys Leu Gly Asp Leu Arg Asp Thr Thr
165 170 175

Thr Pro Lys Ala Ile Ala Ser Thr Leu Asn Lys Phe Leu Phe Gly Ser
180 185 190

Ala Leu Ser Glu Met Asn Gln Lys Lys Leu Glu Ser Trp Met Val Asn
195 200 205

Asn Gln Val Thr Gly Asn Leu Leu Arg Ser Val Leu Pro Ala Gly Trp
210 215 220

Asn Ile Ala Asp Arg Ser Gly Ala Gly Gly Phe Gly Ala Arg Ser Ile
225 230 235 240

Thr Ala Val Val Trp Ser Glu His Gln Ala Pro Ile Ile Val Ser Ile
245 250 255

Tyr Leu Ala Gln Thr Gln Ala Ser Met Glu Glu Arg Asn Asp Ala Ile
260 265 270

Val Lys Ile Gly His Ser Ile Phe Asp Val Tyr Thr Ser Gln Ser Arg
275 280 285